



# LIFE ABOVE THE BRANCHES

**Follow your nose to the rain-forest canopy and get a bird's-eye view of Earth's most diverse ecosystem.**

**by Barbara Bedway**

**W**hen biologist Nalini Nadkarni goes to work, she hoists herself up 30-meter (100-foot) trees. "From the dark, dank, windless world of the rain-forest floor," she says, "I emerge into what feels like the top of the world—the rain-forest canopy."

A strong breeze and warm sunlight strike Nadkarni's face as she surveys the green horizon of treetops around her. Like other scientists investigating the upper reaches of the world's rain forests, Nadkarni is in a race. Her

This toucan can afford to have a brightly colored bill because it has few natural predators in its rainforest canopy home. The colors also help attract mates.

Stuart Westmofland/Tony Stone

## TOTALLY COOL CAREER

### Nalini Nadkarni climbs high

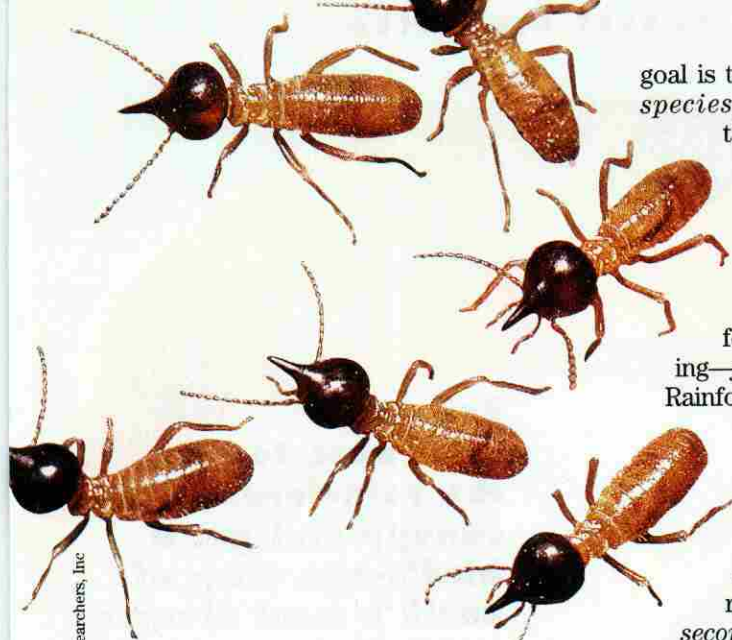


Therese Frare

"I've always enjoyed climbing trees, seeing an entirely different world from above," says Nalini Nadkarni, a canopy biologist. "I also had a great biology teacher who taught us about the wonders of life. Now I've found a way to combine my love of the forest and my love of biology."

For more information about rain-forest canopies or careers, write to:

"Dr. Canopy"  
P.O. Box 10187  
Olympia, WA 98502



Gary Rutherford/Photo Researchers, Inc

**Soldier termites live on wood and leaves in the rain-forest canopy. To defend themselves against predators like ants, the termites shoot a sticky liquid from their nozzle-shape heads.**

goal is to discover the many *species*, or kinds of living things, that make their homes in rain-forest canopies—before the forests disappear.

Unfortunately, the world's rain forests are disappearing—*fast*. According to the Rainforest Action Network, a conservation group, people who clear land for logging, cattle ranching, mining, and farming destroy 2.4 acres of rain forest *every second*. If the forests die, Nadkarni warns, so will the vast majority of species on Earth.

Before biologists started exploring rain-forest canopies, they thought Earth was

home to a few million species, at most. But the “arbornauts”—scientists who climb to or land in rain-forest canopies—have discovered an incredibly diverse array of treetop life. Biologists now estimate that rain-forest canopies alone may be home to more than *30 million* species.

## KEYS TO THE FOREST

One of the most awesome canopy dwellers is a type of plant that seems to live on air! These *epiphytes* grow hundreds of feet from the forest floor—far from any soil in which to lay their roots. Instead, they cling to other trees, soaking up water and nutrients from the humid air.

A single rain-forest tree can be home to several *tons* of epiphytes, including orchids (*see cover*) and bromeliads. These plants provide the feeding and breeding grounds for countless other canopy critters. Bats

One way to explore life in the rain-forest canopy: Climb aboard a raft that's been lowered by an airship onto the canopy branches.



## FAB FACT

**Rain forests cover only 6 percent of Earth's land area. But if you laid all the canopy leaves edge to edge, they would cover the entire surface of the world!**

feed on the bromeliad's nectar. Tree frogs and beetles lay their eggs in the tiny pools of water that collect on the plant's leaves. Other animals search these pools for food. "I've seen tree snakes cruising from one micropond to another looking for a tasty snack," Nadkarni says.

"We think epiphytes are probably a *keystone species*," she says. That's a species that performs such an important function in an *ecosystem* (community of living and nonliving things) that if it were to die out all the other species that depend on it would suffer or move away.

Epiphytes and other canopy plants also provide shade for the diverse species living in the *understory*, the layer of young trees below the canopy, and on the forest floor, Nadkarni says. "In forests with very dense canopies, the understory plants are often adapted to dealing with very-low-light environments," she says. Without that shade, temperatures would rise and water would evaporate. "Then the understory—including tree

seedlings—can be harmed and die," Nadkarni says.

Without a canopy, understory plants would also be deprived of the steady shower of plant debris that falls from above. This debris fertilizes the forest floor to give rooted rain-forest plants the nutrients they need to grow.

## DISAPPEARING DIVERSITY

But rain-forest species—and the scientists who study them—wouldn't be the only ones to suffer if the rain forests were to disappear. "Every species, by virtue of its genetic uniqueness, has something to teach us," says biologist Thomas Eisner of Cornell University.

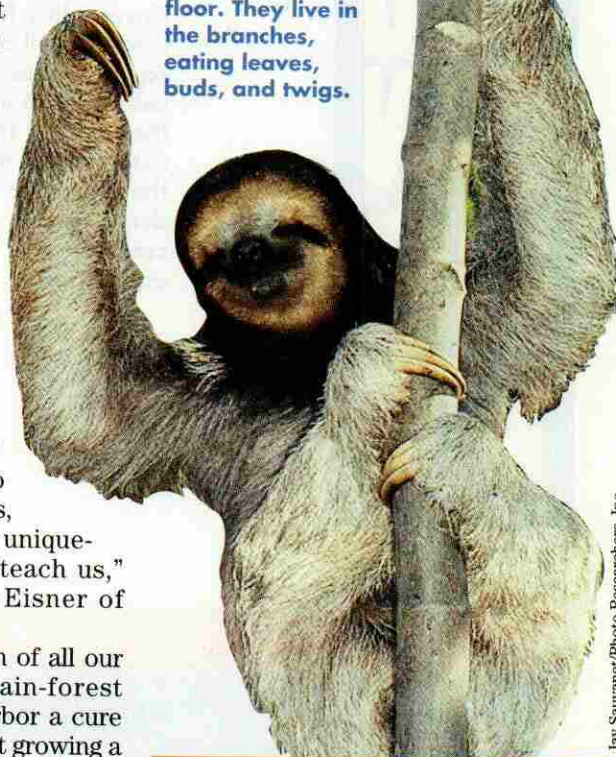
For example, one fourth of all our medicines come from rain-forest plants. One plant may harbor a cure for cancer. "Perhaps a plant growing a few feet away might hold the cure for AIDS," says Robert Halpern, a botanist at the Bronx Zoo in New York City. But we'll never know if the forests are destroyed.

The loss of canopy species could also bring big changes to Earth's atmosphere. "The canopy acts as the lungs of the rain forest," says Nadkarni. The trees "breathe out" water and oxygen and "breathe in" large amounts of carbon dioxide when they make their food through photosynthesis.

Since an estimated 90 percent of rain-forest photosynthesis takes place in canopy foliage, the absence of these trees would mean less water and oxygen—and more carbon dioxide—in Earth's atmosphere. The carbon dioxide, like the glass ceiling of a greenhouse, would trap heat and possibly change Earth's climate (see SW 11/3/95, p. 12).

With so much at stake, it's easy to see why the arbournauts are in a race to uncover treetop secrets. "The future of the rain forest depends on the health of the canopy," says botanist Halpern. So the key to rain-forest survival, he adds, will be finding ways to protect its sheltering heights. Any ideas? ■

South American three-toed sloths rarely descend to the rain-forest floor. They live in the branches, eating leaves, buds, and twigs.



Jay Sauvanet/Photo Researchers, Inc.

## TEEN TRAVELS

### My Amazon journey

by Russell Ezzell, 17  
Oliver Wendell  
Holmes High School  
San Antonio, TX

**M**y science teacher recently took me to the Amazon rain-forest canopy. Since we arrived at night, we climbed to a treetop walkway in the dark. I came face to face with a 1.5-meter(5-ft)-long orange, yellow, and black snake, which slithered away. Then I climbed the walkway to the top of the canopy, 36 meters (118 feet) above ground. I felt as though I could see forever.

By day, the canopy looked totally different. Strange and colorful plants surrounded me. Birds sang, and insects—some as large as birds—buzzed by. Experiencing the beauty of the rain forest firsthand is something I will never forget.

To learn more about trips to the rain forest, write to:

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Raphael Gaillardet/Gamma Liaison